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Expanding the Knowledge Paradigm

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Abstract:

Looking at our changing environment, the question is asked: Are these changes superficial or transformative? This question leads to exploring the frame of reference from which we view reality, and then the sequence from our frame of reference to learning to thinking to action. The author offers that as our world speeds up and becomes more complex, with less time for learning and thinking and more information than anyone can process, we need to move from the mechanical perspective to a new organic frame of reference and reconsider how we learn, think and act. Each of these areas is then expanded upon, with the end result of asking even more questions.

Keywords:

Learning, changing environment, frame of reference, thinking, acting, complexity, world shifts, meta-learning, the new reality, knowledge

That the world has changed significantly in the past decades is well known. The explosive growth in communications, networks and digital technology is felt daily by each of us. The exponential growth of computers and computational speed has resulted in the ubiquitous presence of smart machines. The futurist Kurzweil estimates that computers will have the same computational speed as the human brain within about 15 years. (Kurzweil, 2005) From roughly 12000 BC to 1800 AD the speed of communication was the speed of the fastest horse. During the last 200 years we have increased communication speed from that of a horse to almost the speed of light.

We are buried in information, e-mails, traffic jams and new products. Money moves around the world in a fraction of a second and most people living anywhere in the world can know within minutes if anything significant happens anywhere. As the hype says: the globe is shrinking, the earth is flat, the future is now, and Gaia is dying. Our

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environment can be described as one that is undergoing rapid Change, increasing Uncertainty, growing Complexity and rising Anxiety (CUCA). (Bennet and Bennet, 2004)

This new reality represents a world that differs from the past in ways unheard of just two decades ago. And we have not mentioned new scientific advances such as quantum computing, nanotechnology, bio-genetics, neuroscience, bio-engineering or the manipulation of individual atoms. On the negative side, we have asymmetric warfare, climate threats, deforestation, clean water problems, etc. These global subsystems are complex, interactive, and demand our consideration and actions. From understanding how we learn to working in organizations to global warming we find complexity everywhere quietly growing and entangling itself with its ecological neighbors, making it more difficult to understand, make responsible decisions, and take effective actions.

Whether these changes are superficial or transformative is a vital question. If the changes are simply more of the same, we need only speed up our reactions, work harder and get more relevant information. However, if the changes are foundational, that is, if our world is changing in a substantive way that is formally and functionally different, then we must reconsider our understanding of—and response to—these changes.

The seventeenth century brought us Newton with his calculus and laws of gravity. This could be considered the beginning of the age or reason, determinism or analytical thinking, spawning the industrial era that gave us the world we have enjoyed for the past two centuries. Organizations were created to produce specific products or services and bureaucracies were formed to ensure that the systems were efficient and consistent. This frame of reference of viewing reality as an objective, deterministic, information driven world interprets *learning* as knowing facts and their relationships, *thinking* as using Aristotelian and Stoic logic with valid assumptions and *acting* as controlling the system or correcting the problem. (Devlin, 1997) And for simple and even complicated systems and problems this frame of reference has worked well.

Unfortunately, as complexity grows and spreads throughout our global environment, this mechanistic frame can no longer provide the understanding and answers we need. Mechanistic thinking, like systems thinking, is predominantly objective. That is, the thinker treats the system as an objective phenomenon. With complex organic problems it is important to recognize that all living systems are very much a part of their environment and a false separation may misrepresent the system and make understanding impossible. Autopoiesis, the concept of self-producing systems originated by Maturana and Varella, holds that living systems are created and molded by continuous interaction with their environment and by adaptation through structural coupling the systems grow, survive and co-evolve with their world. (Maturana and Varella, 1987) Anyone trying to understand complex organizations cannot ignore their boundaries and the coupling between the system and its environment. This is the essence of the organic frame of reference.

Consider the sequence from frame of reference to learning to thinking to action. Each of these significantly affects the following ones. For example, the mechanical frame of

reference contains the underlying assumptions of causality, predictability and control. These same assumptions guide learning through objectivity, stability and logical solutions providing specific actions to accomplish one's goals. Learning is about facts, relationships, memory and the rational mind. Thinking then becomes the ability to perform logical operations, understand and anticipate system behavior and the generation of cost benefit trade-offs to determine the right solution. If one has the right information and thinks correctly, the answer will appear. And the answer will likely be some action to change (usually through control) the system under concern. Our educational system is built upon the premise of teaching facts, memorization, logical consistency, and getting the "right" answer. This represents the mechanical paradigm. When it works thats great, when it doesn't we get more information or find another metaphor to use with the paradigm. The accepted meaning of these four concepts: frame of reference, learning, thinking and action are so intertwined and inculcated into our existence that we take them for granted.

By now the problem may be obvious. As our world becomes more complex, with less time for learning and thinking, and all the information that anyone needs, we do not seem to be capable of understanding or dealing with the complexity that surrounds us. This is a symptom calling us to reconsider our frame of reference and how we learn, think and act.

Expanding learning:

Since the educational system came into being, learning has been predominately other-directed. Teachers teach and decide what the student needs to know and students supposedly learn what the teachers teach. Each discipline has its own rules, areas of interest, language, standards of excellence, field of inquiry, and specific paradigm of reality. In a complex world this approach is inadequate because multiple disciplines merge and multi-dimensional knowledge is required. (Wilson, 1998) Rather than being told what to learn, learning must be self-directed by managers and all workers who face continually shifting problems that require multi-disciplinary comprehension.

Another recent shift in attention is from information to knowledge. Information can be considered to be ordered patterns and knowledge is created by the specific association of information in a manner that provides the individual with the capacity to take effective action in varied and uncertain circumstances. (Stonier, 1992; Bennet & Bennet, 2004; Polanyi, 1958) Knowledge consists of theories, laws, facts, information, insights, experiences, heuristics, and mental models that can be recalled and assimilated in a manner that creates understanding and meaning. When the individual has an understanding and meaning of a problem they can better anticipate the consequences of possible actions and thereby determine what actions will be most effective. Since complex systems do not often submit to data, information and logic alone, knowledge becomes the single key to problem solving and decision-making.

While learning in a complex world may start with gathering facts, theories, etc. what is most critical is understanding (knowledge) in those areas related to the problem/situation of interest. Such knowledge may be created by individuals, leveraged through team

techniques, or even reside at the organizational level. Successfully dealing with complex organic systems, then, is not so dependent upon *how much* information is available, but rather on *what knowledge* can be brought to bear on the situation. It is not the *amount* that is learned, it is *what* is learned and *how well* it leads to understanding and meaning. Questions and their consequent possibilities may be far more important than answers when dealing with situations that may not have single, or simple, solutions. Answers close off thinking, but questions generate ideas and possibilities that lead to more ideas, eventually building a landscape of insights and understanding that guides thinking and action.

Another shift in learning moves us from trial and error to meta-learning. In problem solving under the mechanical paradigm one learns to do the thinking by trial and error until it becomes error free. We work on a math or engineering design problem until we get it "right." A manager with an internal communication issue typically tries one thing, sees if it works, and if it doesn't tries something else. Managers are often hesitant to take multiple, simultaneous actions to solve a problem. The outcome of such an approach is unpredictable since multiple actions entangle causality and may separate actions from consequences. This increases the risk of doing harm and the possibility of unintended consequences—two of the great no-no's of management.

Not surprisingly, complex organic systems are often insensitive to a single action. The resilience of most organizations is amazing. J. Forrester and others found this out in their system dynamics modeling work. In Forrester's own words: "Every time you make a single change in an organization the near term reaction is what you intended and the long term is exactly what you did not want; Matters are made worse." (Forrester, 1971; and private communication) Single point solutions to problems work fairly well in a deterministic, complicated system. In a complex system the understanding needed to deal with complex problems is nonlinear and context dependent. One may not be sure what the problem is in a complex situation, much less what the solution should be. Thus different ways of learning are needed by the problem solver and to access these different ways requires an understanding of how we learn, think and go about solving problems—meta-learning, learning new ways to learn.

Another aspect of dealing with complexity is the efficacy of group learning. Groups are almost always more effective in developing diverse frames of reference and multiple learning approaches. They can expose and create a breadth of information and knowledge far beyond what a single individual is capable of doing. With a broad scope of data, information and knowledge relevant to a specific complex issue—coupled with collaborative and dialogue oriented interactions—a team can develop better insights and solutions to complex challenges.

In the process of learning how to learn, we expand both our "approach" to learning and our capacity to select "what" is learned, take personal responsibility for how and what we learn, and understand the difference between information and knowledge. We learn to ask more questions, keep options open, understand our personal learning processes, and become competent in working nonlinearly and productively with others. We can also

broaden our own interests and competencies, and always be prepared to transform ourselves to see problems in a different light and find ways to understand seemingly incomprehensible situations. There are theories and processes that address some of these challenges. Examples are Critical Thinking, (Brookfield, 1987) Transformational Learning, (Mezirow, 1991) Action Learning, (Marquardt, 1999) and Self-Directed Learning. (Tough, 1979) Recent research indicates that our entire body is much more involved in the learning process than previously thought. (Pert, 1997; HeartMath, 2001, Russell, 2004).

Expanding Thinking

With learning comes thinking. By thinking we mean the entire processes of creating and associating patterns of neurons throughout the body. Also included as part of our "thinking system" are chemical changes such as hormones, the heart, the unconscious, and the emotional system.

What can help us expand our thinking beyond the common assumption of simple causation to take into account such complex phenomena as emergence, nonlinearity, energy flows, self-organization, tipping points, and phase changes? Dealing with new concepts requires a new language, finding appropriate metaphors and analogies, and asking different questions. In a complex world, objects/elements may be far less important than their relationships and their relationships less meaningful than how, what and why certain patterns are formed. Significant influence factors may be hidden by their super-sensitivity to small changes created by the interaction of multiply interconnected loops—the famous butterfly effect. We may find landscapes, attractors, time delays, feedback loops that are related but not in our normal pattern of linear cause and effect.

When solving problems that are complicated rather than complex, we typically use a reductionist approach that works well by leaning on the strength of mathematics, logic, computer tools, and empirical testing. On the other hand, when working with organizational or environmental complexity it is useful to think holistically, that is to emphasize the importance of the whole and the interdependence of the parts. By studying the large scale characteristics of a system one may be able to interpret meaning from past trends, relationships with lower level systems, and simple generative rules. By using our experience, our intuition, and the large knowledge base we have developed and stored within our unconscious mind, we may be able to get a "feel" for how a system works. For example, in addition to reflective thinking, so useful in causative systems, one should consider lucid dreaming as an aid to understanding complex problems. Other approaches include using metaphors, analogies, narratives, mind-mapping, and process diagrams, a well as creative learning processes like Lateral Thinking, Synectics, Idea Fisher, and Brainstorming

For complex organic problems it may be impossible to find a specific solution due to the inability to predict the systems future behavior. Developing set solutions or cones of possibilities will provides wiggle-room for the solution and provoke the problem solver to create multiple possible solutions. For example, instead of a solution that includes a

specific strategy and target goal, one could develop a strategic direction that allows implementing decision-makers space to guide the complex system toward some set of end goals, all within acceptable range of performance. Such strategy would require careful considerations of seeding, (taking simultaneous actions throughout the system), self-organization, structural coupling and sustainability.

Expanding Actions

After expanding our frame of reference, learning and thinking, comes the need for a broader set of actions. What we do is the ultimate test of "who" we are—how we see the world and how we deal with problems, situations and opportunities. Complex organic problems require a broader set of actions than single causal solutions. Since control does not work, influence must be used to move a complex system. The individual actions taken to change a complex situation are direction oriented rather than solution focused. Multiple actions taken at various places throughout an organization can have a stronger influence in changing the emergent characteristic than any single act.

The act of collaborating with others will create a positive, proactive environment that is much more effective in dealing with complexity than using one person's knowledge. By taking actions that leverage knowledge and implementation activities, a manager can create a broader understanding of the problem and apply multiple, coherent influences that move the system toward the desired state.

Any complex system that remains stable for some length of time has adapted to external forces. When a system remains stable it tends to reinforce or lock-in those connections and forces that support such equilibrium. The longer an organization is in a state of equilibrium the more difficult it is to break-down relationships, expectations and habits. A wise manager recognizes the importance of adaptation and builds an infrastructure that encourages flexibility. They also perturb their organization to make change a way of life. Such actions must be positive, fostering learning, growth and teamwork in employees.

Most managers recognize the importance of efficiency and its relationship to profitability. The industrial age made this almost a mantra of management; and it is still valid in long-lived assembly lines and stable production processes. However, in a CUCA world where change demands continuous learning and complexity breeds an uncertainty that demands redundancy and trial and error, the standard meaning of efficiency looses its validity. Minimum cost must now include the cost of learning, dialogue and planned redundancy if an organization is to survive over time. Mistakes become expected and planned into budgets. Workforce learning is an investment in resources and assets, not a personnel support program. Actions that educate workers beyond their immediate training needs pay long term dividends in organizational innovation, cohesion, learning and competency. Actions that focus on effectiveness over time, i.e., sustainable performance, are the actions that will make the difference in the organization.

Historically organizations have sent workers to training courses to improve their knowledge in a specific area deemed important to the firm. Little attention has been paid

to how workers learn or how they create, leverage and mobilize knowledge throughout their organization. For example, managers can easily support and participate in coffee mess conversations, lunchtime presentations, Q&A sessions, communities of practice and interest discussions on what needs to be learned and how to improve the learning capacity of the organization. Organizational learning is an emergent characteristic of every complex organization and it is nurtured and facilitated by open forum dialogue and interest groups addressing subjects like critical thinking, andragogy, transformational learning, action learning etc.

Leaders who can stimulate their organizations to learn can then use that as an opportunity to build a workforce that possesses integrative competencies in addition to their discipline expertise. These competencies—such as systems and complexity thinking, relationship network management, critical thinking, information literacy and the risk of non-collaboration—serve to integrate local actions, leverage knowledge and make workers aware of their impact on other parts of the organization. This awareness also facilitates local adaptation, quick response and a 'connectedness of choices' throughout the organization,

In summary, actions make the difference and a different set of actions need to be taken by managers and workers who work in complex organizations and/or must deal with complex situations. Organizations that desire sustainable high performance need to expand their paradigms of action, thinking and learning. We can no longer continue to see the world as Newtonian, relatively stable, causally explainable and deterministic. The world we find today is rapidly changing, highly uncertain and growing in complexity. These differences are fundamental to our epistemology and ontology. To maintain performance we need to re-assess what we know, how we learn, how we see ourselves and how we relate to others. And as we rush headlong into the unknown world of the future, ask questions.

Do managers or leaders really know all of the answers? Can anyone predict what markets will look like in two years? Will our past successes tell us what we need to do next month? How do we know what we know, and can we upgrade our capacity to learn to keep up with the pace of life? How can we second guess an unpredictable future? Which is more important efficiency of effectiveness? How do we review and reconsider the very foundation of our experiences, successes and ways of being and knowing? Is short term profitability better than long term sustainability? How can I justify an intuitive decision to my boss? How do I get workers to be creative, share knowledge and run with empowerment? Am I really expected to have all of the answers?

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